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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/551,573	10/03/2005	Atsushi Nakamura	OKUDP0135US	4401

51921 7590 01/25/2008

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EXAMINER	
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ART UNIT	**PAPER NUMBER**
2627	
MAIL DATE	**DELIVERY MODE**
01/25/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/551,573	NAKAMURA ET AL.	
	Examiner	Art Unit	
	Michael V. Battaglia	2627	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 October 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,5-13 and 15-17* is/are rejected.

7)☒ Claim(s) *4 and 14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 October 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

2. Figures 5 and 10 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

4. Claims 1, 2, 4, 5, 9, 10, 12, 14 and 17 are objected to because of the following informalities: Through the claims, replacing "n," "n+1," "n+2" and "n+3" with --nTw,-- --(n+1)Tw,-- --(n+2)Tw-- and --(n+3)Tw-- is suggested. Appropriate correction is required.

Invocation of 35 USC § 112, Sixth Paragraph

5. The following is a quotation of the sixth paragraph of 35 U.S.C. 112:

> An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.

The following is a quotation of MPEP 2181(I):

> A claim limitation will be presumed to invoke 35 U.S.C. 112, sixth paragraph, if it meets the following 3-prong analysis: (A) the claim limitations must use the phrase "means for" or "step for;" (B) the "means for" or "step for" must be modified by functional language; and (C) the phrase "means for" or "step for" must not be modified by sufficient structure, material, or acts for achieving the specified function.

The claimed "laser driving means," "coding means" and "mark length classifying means" limitations of claim 10, the "pulse shifting means" limitation of claim 16 and the "write compensating means" of claim 17 use the phrase "means for" modified by functional language and not modified by sufficient structure for achieving the specified function. Accordingly, the "means for" limitations of claims 10, 16 and 17 are presumed to invoke 35 U.S.C. 112, sixth paragraph.

"If the specification defines what is meant by [a means-plus-function claim] limitation for the purposes of the claimed invention, the examiner should interpret the limitation as having that meaning" (MPEP 2182). The specification defines the structure corresponding to the claimed "laser driving means" and "coding means" as laser driver 111 (Page 36, lines 8-10) and data modulator 113 (Page 37, lines 6-10) respectively of Figs. 1 and 2. The specification defines the structure corresponding to the claimed "mark length classifying means" as write waveform generator 112 of Figs. 1 and 2 consisting of mark length classifier 201, counter 205 and write waveform table 202 connected as shown in Fig. 2 (Page 41, lines 2-18). The specification defines the structure corresponding to the claimed "pulse shifting means" as pulse shifter 115 of Figs. 1 and 2. The specification defines the structure corresponding to the claimed "write compensating means" as pulse shifter 115 and write compensator 118 of Figs. 1 and 2. Accordingly, the claimed "laser driving means," "coding means" and "mark length classifying means" limitations of claim 10, the claimed "pulse shifting means" limitation of claim 16 and the

claimed "write compensating means" of claim 17 have been given those interpretations in the rejections below.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3 and 5-8 are rejected under 35 U.S.C. 102(e) as being anticipated by Ito et al (hereinafter Ito) (US 7,242,657). Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

In regard to claim 1, Ito discloses a data recording method for recording data as edge position information, including marks and spaces of multiple different lengths, on a storage medium (Figs. 4 and 5, element 100) by irradiating the storage medium with a pulsed energy beam (Col. 7, line 61-Col. 8, line 3), the method comprising the steps of: (A) generating an NRZI data based on the data to be recorded ("EFM mark lengths" of Col. 9, lines 56 and 65); (B) determining a write pulse waveform, defining the power modulation of the energy beam, according to the code lengths of respective codes included in the NRZI data (Col. 9, line 64-Col. 10, line 1); and (C) modulating the power of the energy beam based on the write pulse waveform (Col. 10, lines 1-15 and Fig. 6), wherein if the shortest code length of the NRZI data is n (which

is an integer equal to or greater than one), the step (B) includes assigning a write pulse waveform that has only one write pulse to recording mark making periods corresponding to codes with code lengths x of n, n+1 and n+2, and a write pulse waveform that has multiple write pulses Pw to recording mark making periods corresponding to codes with code lengths x of n+3 or more, respectively (Fig. 6; Col. 9, line 64-Col. 10, line 15; and note that n=3).

In regard to claim 2, Ito discloses that if the shortest code length of the NRZI data is n (which is an integer equal to or greater than one), the step (B) includes classifying the code lengths x into at least four lengths including n, n+1, n+2 and n+3 or more, and wherein as to two codes, which have code lengths m and m+1, respectively, and which have the same number of write pulses Pw in the recording mark making period of their write pulse waveforms, the step (B) includes determining the write pulse waveforms so as to satisfy the inequality: (write pulse width of code length m)≤(write pulse width of code length m+1) where the "write pulse width of code length m" is the width of an arbitrary Kth write pulse period included in the recording mark making period corresponding to the code length m and the "write pulse width of code length m+1" is the width of the Kth write pulse period included in the recording mark making period corresponding to the code length m+1 (Fig. 6).

In regard to claim 3, Ito discloses that as to two codes, which have code lengths m and m+1, respectively, and which have the same number of write pulses Pw and the same number of periods with a bottom power level Pb between two write pulses Pw in the recording mark making period of their write pulse waveforms, the step (B) includes determining the write pulse waveforms so as to satisfy the inequality: (pulse width of code length m)≤(pulse width of code length m+1) where the "pulse width of code length m" is the width of an arbitrary Kth period

with the bottom power level Pb included in the recording mark making period corresponding to the code length m and the "pulse width of code length m+1" is the width of the Kth period with the bottom power level Pb included in the recording mark making period corresponding to the code length m+1 (Fig. 6 and see Fig. 1).

In regard to claim 5, Ito discloses that, in the recording mark making period corresponding to codes with code lengths x of n+3 or more, the length of a period in which the write pulse waveform has an erasure power level Pe is set to be at least equal to 1 Tw (Fig. 6, see Fig. 1, and note each write pulse waveform has a period of at least 1T in length at the end of the waveform in which the waveform has an erasure power level).

In regard to claim 6, Ito discloses that, in each said recording mark making period, the length of a period in which the write pulse waveform has the bottom power level Pb is set to be at least equal to 1 Tw (Fig. 6 and see Fig. 1).

In regard to claim 7, Ito discloses that, in each said recording mark making period, the length of a period in which the write pulse waveform has a cooling power level Pc is set to be at least equal to 1 Tw (Fig. 6, see Fig. 1, and note that cooling power level is equal to the bottom power level).

In regard to claim 8, Ito discloses that the start position of the first pulse, included in a recording mark making period of the write pulse waveform, and the end position of a cooling pulse (last pulse of each of the recording pulse waveforms shown in Fig. 6 having the bottom power level shown in Fig. 1), also included in the recording mark making period, are shifted according to the length x of a code associated with the recording mark making period (Fig. 6).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 10-13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant Admitted Prior Art (hereinafter AAPA) in view of Ito. It is noted that citations to AAPA refer to Applicant's specification. Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

In regard to claim 10, AAPA discloses an apparatus for recording data as edge position information, including marks and spaces of multiple different lengths, on a storage medium by irradiating the storage medium with a pulsed energy beam, the apparatus comprising: laser driving means [laser driver] (Fig. 10, element 1011) for modulating the power of the energy beam; coding means [data modulator] (Fig. 10, element 1013) for converting the data to be recorded on the storage medium into an NRZI data; and mark length classifying means [write waveform generator consisting of mark length classifier, counter and write waveform table] (Fig. 10, elements 1001, 1002 and 1005) for determining a write pulse waveform (Fig. 10, element 1025), defining the power modulation of the energy beam (Fig. 10, elements 1006-1009), according to the code lengths x of respective codes included in the NRZI data (Fig. 5). AAPA does not disclose that, if the shortest code length of the NRZI data is n (which is an integer equal to or greater than one), the mark length classifying means assigns a write pulse

waveform that has only one write pulse Pw to recording mark making periods corresponding to codes with code lengths x of n, n+1 and n+2, and a write pulse waveform that has multiple write pulses Pw to recording mark making periods corresponding to codes with code lengths x of n+3 or more, respectively.

Ito discloses a mark length classifying means (inherent means which performs the waveform generation of Fig. 6 and Col. 9, line 64-Col. 10, line 8) for determining a write pulse waveform (Fig. 6), defining the power modulation of an energy beam, according to the code lengths x of respective codes included in the NRZI data, wherein if the shortest code length of the NRZI data is n (which is an integer equal to or greater than one), the mark length classifying means assigns a write pulse waveform that has only one write pulse Pw to recording mark making periods corresponding to codes with code lengths x of n, n+1 and n+2, and a write pulse waveform that has multiple write pulses Pw to recording mark making periods corresponding to codes with code lengths x of n+3 or more, respectively (Fig. 6; Col. 9, line 64-Col. 10, line 15; and note that n=3). Ito teaches that "[b]y distributing the number . . . of recording pulses in this manner for the various recording mark lengths, it becomes possible to obtain a sufficiently high light beam power, that is, a sufficiently high recording (write) power, even at high recording linear velocities, and the jitter can be reduced" (Col. 10, lines 8-15).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made for the mark length classifying means of AAPA to assign a write pulse waveform in the manner suggested by Ito, the motivation being to enable a sufficiently high light beam power to be obtained even at high recording linear velocities.

In regard to claim 11, Ito discloses that as to two codes, which have code lengths m and m+1, respectively, and which have the same number of write pulses Pw and the same number of periods with a bottom power level Pb between two write pulses Pw in the recording mark making period of their write pulse waveforms, the write pulse waveforms are determined so as to satisfy the inequality: (pulse width of code length m)≤(pulse width of code length m+1) where the "pulse width of code length m" is an arbitrary Kth period with the bottom power level included in the recording mark making period corresponding to the code length m and the "pulse width of code length m+1" is the Kth period with the bottom power level included in the recording mark making period corresponding to the code length m+1 (Fig. 6 and see Fig. 1).

In regard to claim 12, Ito discloses that, if the shortest code length of the NRZI data is n (which is an integer equal to or greater than one), the code lengths x are classified into at least four lengths including n, n+1, n+2 and n+3 or more, and wherein as to two codes, which have code lengths m and m+1, respectively, and which have the same number of write pulses Pw in the recording mark making period of their write pulse waveforms, the write pulse waveforms are determined so as to satisfy the inequality: (write pulse width of code length m).ltoreq.(write pulse width of code length m+1) where the "write pulse width of code length m" is the width of an arbitrary Kth write pulse period included in the recording mark making period corresponding to the code length m and the "write pulse width of code length m+1" is the width of the Kth write pulse period included in the recording mark making period corresponding to the code length m+1 (Fig. 6).

In regard to claim 13, Ito discloses that, as to two codes, which have code lengths m and m+1, respectively, and which have the same number of write pulses Pw and the same number of

periods with a bottom power level Pb between two write pulses Pw in the recording mark making period of their write pulse waveforms, the write pulse waveforms are determined so as to satisfy the inequality: (pulse width of code length m).ltoreq.(pulse width of code length m+1) where the "pulse width of code length m" is the width of an arbitrary Kth period with the bottom power level Pb included in the recording mark making period corresponding to the code length m and the "pulse width of code length m+1" is the width of the Kth period with the bottom power level Pb included in the recording mark making period corresponding to the code length m+1 (Fig. 6 and see Fig. 1).

In regard to claim 15, Ito discloses that the write pulse waveforms are determined such that every interval between trailing and leading edges of a fundamental waveform of a laser pulse in the mark making periods becomes at least equal to a detection window width Tw (Fig. 6).

8. Claims 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ito in view of AAPA as applied to claim 11 above, and further in view of Seo (US 6,762,986). Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

In regard to claim 16, Ito in view of AAPA disclose the apparatus of claim 11 but do not disclose that the apparatus comprises pulse shifting means [pulse shifter] for shifting the start position of the first pulse, included in a recording mark making period of the write pulse waveform, and the end position of a cooling pulse, also included in the write pulse waveform, according to the length x of a code associated with the recording mark making period.

Seo discloses an apparatus (Fig. 6) for recording data as edge position information, including marks and spaces of multiple different lengths, on a storage medium (Fig. 6, element 180) by irradiating the storage medium with a pulsed energy beam (Figs. 1-5), the apparatus comprising: laser driver (Fig. 6, element 140) for modulating the power of the energy beam; an inherent data modulator for converting the data to be recorded on the storage medium into an NRZI data ("NRZI DATA" of Fig. 6); pulse shifting means [pulse shifter] (Fig. 6, elements 120 and 104) for shifting the start position ("SFP" of Fig. 4C) of the first pulse, included in a recording mark making period of the write pulse waveform, and the end position ("ELC" of Fig. 4C) of a cooling pulse, also included in the write pulse waveform, according to the length x of a code associated with the recording mark making period (Fig. 4 and Col. 7, lines 13-41). Seo teaches that the pulse shift means enables an adaptive record mode in which the "correlation between a mark and the preceding and following spaces of the mark," which may differ depending on the type of the disc" and is "essential for optimal recording," is considered (Col. 7, lines 13-41).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the apparatus of Ito in view of AAPA to comprise a pulse shifting means [pulse shifter] for shifting the start position of the first pulse, included in a recording mark making period of the write pulse waveform, and the end position of a cooling pulse, also included in the write pulse waveform, according to the length x of a code associated with the recording mark making period as suggested by Seo, the motivation being to enable an adaptive record mode in which the correlation between a mark and the preceding and following spaces of the mark, which may differ depending on the type of the disc and is essential for optimal recording, is considered.

In regard to claim 17, the apparatus of Ito in view of AAPA and further in view of Seo comprises a write compensating means [pulse shifter and write compensator] (Fig. 6 of Seo, elements 120 and 104) for shifting the positions to at least four different degrees corresponding to the code lengths x of n, n+1, n+2 and n+3 or more (Fig. 4B of Seo and note that there are eight setting points ("Setting Point C_SFP[2..0]" of Fig. 4B) for the start position of the first pulse and eight setting points ("Setting Point C_ELC[2..0]" of Fig. 4B) for the end position of the cooling pulse and that the setting points are selected taking into consideration the code/mark length).

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ito, as applied to claim 8 above, and further in view of Seo. Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Ito discloses the method of claim 8 but does not disclose that the positions are shifted to at least four different degrees corresponding to the code lengths x of n, n+1, n+2 and n+3 or more.

Seo discloses a data recording method in which the start position ("SFP" of Fig. 4C) of the first pulse, included in a recording mark making period of a write pulse waveform, and the end position ("ELC" of Fig. 4C) of a cooling pulse, also included in the write pulse waveform, are shifted to at least four different degrees corresponding to the code lengths x of n, n+1, n+2 and n+3 or more (Fig. 4; Col. 7, lines 13-41; and note that there are eight setting points ("Setting Point C_SFP[2..0]" of Fig. 4B) for the start position of the first pulse and eight setting points ("Setting Point C_ELC[2..0]" of Fig. 4B) for the end position of the cooling pulse and that the setting points are selected taking into consideration the code/mark length). Seo teaches that the

shifting enables an adaptive record mode in which the "correlation between a mark and the preceding and following spaces of the mark," which may differ depending on the type of the disc" and is "essential for optimal recording," is considered (Col. 7, lines 13-41).

It would have been obvious to one of ordinary skill in the art at the time the invention was made for the method of Ito to shift the positions of Ito to at least four different degrees corresponding to the code lengths x of n, n+1, n+2 and n+3 or more as suggested by Seo, the motivation being to perform adaptive recording in which the correlation between a mark and the preceding and following spaces of the mark, which may differ depending on the type of the disc and is essential for optimal recording, is considered.

Allowable Subject Matter

10. Claims 4 and 14 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. In regard to claim 4, none of the references of record alone or in combination suggest or fairly teach a data recording method including all the limitations of claim and wherein the write pulse waveform in the recording mark making period corresponding to codes with code lengths x of n+3 or more includes write pulses, of which the number is equal to the quotient obtained by dividing (x-1) by two. In regard to claim 14, none of the references of record alone or in combination suggest or fairly teach an apparatus including all the limitations of claim 10 and wherein the write pulse waveform in the recording mark making periods corresponding to codes with code lengths x of n+3 or more is determined so as to include a number of write pulses that is equal to the quotient obtained by dividing (x-1) by two.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kato et al. (US 7,082,090) (Figs. 4-10) and Miura et al. (US 7,227,826) (Fig. 6) disclose assigning one write pulse to recording marks with code lengths of nT and (n+1)T and assigning multiple write pulses to recording marks with code lengths of (n+2)T or more. Harigaya et al (US 2003/0012917) disclose a write pulse waveform including write pulses equal in number to the quotient obtained by dividing x by two where x is code length of the write pulse waveform (Fig. 5). Yokio et al (US 5,732,062) disclose a recording strategy where one write pulse is assigned to marks 3T in length and two write pulses are assigned to marks 4T-6T in length (Fig. 34).

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael V. Battaglia whose telephone number is (571) 272-7568. The examiner can normally be reached on M-F, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, A. Wellington can be reached on (571) 272-4483. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Michael Battaglia

MICHAEL V. BATTAGLIA
PATENT EXAMINER